

## CLAIMS

1. A ceramic filter assembly integrated by adhering together a plurality of columnar honeycomb filters made of a porous ceramic sintered material with a ceramic sealing material layer and having a generally elliptical cross sectional shape when cut parallel to end faces of the plurality of honeycomb filters, the ceramic filter assembly characterized in that:

the plurality of honeycomb filters include a honeycomb filter having a rectangular cross sectional shape when cut parallel to the end faces and provided with a long side having length B1 and a short side having length B2 in which the ratio B1/B2 is between 1.1 and 3.0, the honeycomb filter being arranged so that the long side and the short side of the honeycomb filter are respectively parallel to the major axis and the minor axis of the assembly.

2. A ceramic filter assembly integrated by adhering together a plurality of columnar honeycomb filters made of a porous ceramic sintered material with a ceramic sealing material layer and having a generally elliptical cross sectional shape when cut parallel to end faces of the plurality of honeycomb filters, the ceramic filter assembly characterized in that:

each honeycomb filter includes a plurality of rectangular cells extending along an axis of the filter with each cell provided with a long side having length C1 and a short side having length C2 in which the ratio C1/C2 is between 1.1 and 3.0, the plurality of honeycomb filters being arranged so that the long sides of the cells are parallel to the major axis of the assembly and the short sides of the cells are parallel to the minor axis of the

assembly.

3. A ceramic filter assembly integrated by adhering together a plurality of columnar honeycomb filters made of a porous ceramic sintered material with a ceramic sealing material layer and having a generally elliptical cross sectional shape when cut parallel to end faces of the plurality of honeycomb filters, the ceramic filter assembly characterized in that:

each honeycomb filter includes a plurality of rectangular cells extending along an axis of the filter and defined by relatively thick cell walls and relatively thin walls that are orthogonal to each other, the plurality of honeycomb filters being arranged so that the relatively thick cell walls are parallel to the major axis of the assembly and the relatively thin cell walls are parallel to the minor axis of the assembly.

4. The ceramic filter assembly as claimed in claim 3, characterized in that when the thickness of the relatively thick cell walls is represented by  $D1$  and the thickness of the relatively thin cell walls is represented by  $D2$ ,  $D1$  and  $D2$  are within a range of 0.1 to 0.5 mm, and the ratio  $D1/D2$  is 3 or less.

5. A ceramic filter assembly integrated by adhering together outer surfaces of a plurality of columnar honeycomb filters made of a porous ceramic sintered material with a ceramic sealing material layer and having a generally elliptical cross sectional shape when cut parallel to end faces of the plurality of honeycomb filters, the ceramic filter assembly characterized in that:

the ceramic sealing material layer includes a first

sealing material layer extending parallel to the major axis of the assembly and a second sealing material layer extending orthogonal to the major axis of the assembly, the first sealing material layer being thicker than the second  
5 sealing material layer.

6. The ceramic filter assembly as claimed in claim 5, characterized in that when the thickness of the first sealing material layer is represented by E1 and the  
10 thickness of the second sealing material layer is represented by E2, E1 and E2 are between 0.3 mm to 3 mm, and the ratio E1/E2 is 1.05 or greater and 5 or less.

7. A ceramic filter assembly integrated by adhering  
15 together a plurality of columnar honeycomb filters made of a porous ceramic sintered material with a ceramic sealing material layer and having a generally elliptical cross sectional shape when cut parallel to end faces of the plurality of honeycomb filters, the ceramic filter assembly  
20 characterized in that:

the ceramic sealing material layer includes a first sealing material layer parallel to the major axis of the assembly and a second sealing material layer orthogonal to the major axis of the assembly, the first sealing material  
25 layer having thermal conductivity that is lower than the thermal conductivity of the second sealing material layer.

8. The ceramic filter assembly as claimed in claim 7, characterized in that when the thermal conductivity of the  
30 first sealing material layer is represented by G1 and the thermal conductivity of the second sealing material layer is represented by G2, the ratio G1/G2 is 0.2 or greater and 0.7 or less.

9. A ceramic filter assembly integrated by adhering together a plurality of columnar honeycomb filters made of a porous ceramic sintered material with a ceramic sealing material layer made of ceramic and having a generally elliptical cross sectional shape when cut parallel to end faces of the plurality of honeycomb filters, the ceramic filter assembly being characterized by:

an outer sealing material layer made of ceramic and formed on the periphery of the assembly, the outer sealing material layer including a first portion located along an extension of the major axis of the assembly that is thicker than a second portion located along an extension of the minor axis of the assembly.

10. The ceramic filter assembly as claimed in claim 9, characterized in that when the thickness of the first portion is represented by H1 and the thickness of the second portion is represented by H2, the ratio  $H2/H1$  is 0.06 or greater and 0.95 or less.

11. The ceramic filter assembly as claimed in claim 9, characterized in that the outer sealing material layer is formed from two or more types of a coating material having different thermal conductivity.

12. A canning body being characterized by:

a ceramic filter assembly integrated by adhering together a plurality of columnar honeycomb filters made of a porous ceramic sintered material with an inner sealing material layer made of ceramic and having a generally elliptical cross sectional shape when cut parallel to end faces of the plurality of honeycomb filters;

a tubular casing for accommodating the ceramic filter assembly; and

a thermal insulation material arranged between the casing and the ceramic filter assembly, the thermal  
5 insulation material including a first portion located along an extension of the major axis of the assembly and a second portion located along an extension of the minor axis of the assembly, wherein the first portion is thicker than the second portion.

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13. The canning body as claimed in claim 12, characterized in that when the thickness of the first portion is represented by  $I_1$  and the thickness of the second part is represented by  $I_2$ , the ratio  $I_2/I_1$  is 0.30 or  
15 greater and 0.91 or less.

14. The canning body as claimed in claim 12, wherein the thermal insulation material is made of two or more types of material having different thermal conductivity.

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15. A columnar honeycomb filter made of a porous ceramic sintered material, characterized in that the honeycomb filter has a rectangular cross sectional shape when cut parallel to an end face thereof and is provided  
25 with a long side having length  $B_1$  and a short side having length  $B_2$  in which the ratio  $B_1/B_2$  is 3.0 or less.

16. A columnar honeycomb filter made of a porous ceramic sintered material, being characterized by a  
30 plurality of cells, extending along the axial direction thereof, and an end face, each cell having a rectangular cross sectional shape when cut parallel to the end face, wherein each cell is provided with a long side having length

C1 and a short side having length C2 in which the ratio C1/C2 is 3.0 or less.

17. A columnar honeycomb filter made of a porous ceramic sintered material, being characterized by a plurality of rectangular cells extending along the axial direction of the honeycomb filter, each rectangular cell being defined by a relatively thick cell wall and a relatively thin cell wall that are orthogonal to each other.

18. The columnar honeycomb filter as claimed in claim 17, characterized in that when the thickness of the relatively thick cell wall is represented by D1 and the thickness of the relatively thin cell wall is represented by D2, the ratio D1/D2 is 3 or less.

19. The honeycomb filter as claimed in any one of claims 15 to 18, wherein the porous ceramic sintered material includes silicon carbide and metal silicon.

20. The columnar honeycomb filter as claimed in any one of claims 15 to 19, wherein a catalyst is carried.

21. A ceramic filter assembly integrated by adhering together a plurality of columnar honeycomb filters made of a porous ceramic sintered material with a ceramic sealing material layer and having a generally elliptical cross sectional shape when cut parallel to end faces of the plurality of honeycomb filters, the ceramic filter assembly characterized in that:

when a hypothetical first straight line intersects the generally elliptical contour at two points in which the distance therebetween is maximum and a hypothetical second

straight line orthogonal to the first straight line intersects the generally elliptical contour at two points in which the distance therebetween is maximum, the number of sealing material layers the first straight line of the  
5 assembly traverses is less than or equal to the number of sealing material layers the second straight line traverses.